

**What Is Claimed Is:**

1. A method of transferring packets from communication hardware to a host computing device, the method comprising:
  - 5 receiving a set of packets at a communication interface;
  - in a first buffer of a host computing device, writing a first completion line configured to identify a first payload buffer in which payloads of a first subset of the packets are stored;
  - for each packet in the set of packets, writing a corresponding per-packet completion line in the first buffer;
  - 10 after writing said per-packet completion lines, writing a null completion line; and
  - signaling the host computing device that a set of packets has been transferred.
- 15 2. The method of claim 1, further comprising:
  - in the first buffer, writing a second completion line configured to identify a second payload buffer in which payloads of a second subset of the packets are stored.
- 20 3. The method of claim 1, wherein said signaling comprises writing a single completion descriptor to identify the first buffer.
4. The method of claim 3, wherein said completion descriptor  
25 comprises only said first buffer identity.
5. The method of claim 1, wherein said first completion line is

configured to identify the first payload buffer.

6. The method of claim 5, wherein:

said first completion line further comprises a checksum type field and a  
5 checksum start field; and  
said checksum type field and said checksum start field apply to every  
packet in the first subset of packets.

7. The method of claim 1, wherein said writing a per-packet  
10 completion line comprises packing said per-packet completion lines into the first  
buffer.

8. The method of claim 7, further comprising:  
packing headers of the packets into the first buffer.

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9. The method of claim 1, wherein each said per-packet completion  
line comprises:  
a length of a header of the corresponding packet; and  
a length of a payload of the corresponding packet.

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10. The method of claim 9, wherein each said per-packet completion  
line further comprises:  
an offset of the payload of the corresponding packet within a buffer in  
which the payload is stored; and  
25 a checksum of the corresponding packet.

11. The method of claim 1, wherein each packet in the set of packets is

part of the same communication connection.

12. The method of claim 1, further comprising at the host computing device, after said signaling:

5 reading said per-packet completion lines until encountering said null completion lines; and

using said per-packet completion lines to access headers and payloads of the corresponding packets.

10 13. A computer readable medium storing instructions that, when executed by a computer, cause the computer to perform a method of transferring packets from communication hardware to a host computing device, the method comprising:

receiving a set of packets at a communication interface;

15 in a first buffer of a host computing device, writing a first completion line configured to identify a first payload buffer in which payloads of a first subset of the packets are stored;

for each packet in the set of packets, writing a corresponding per-packet completion line in the first buffer;

20 after writing said per-packet completion lines, writing a null completion line; and

signaling the host computing device that a set of packets has been transferred.

25 14. A computer readable medium containing a data structure configured for describing multiple packets to a host computing device, the data structure comprising:

one or more headers of packets being transferred from communication hardware to the host computing device; and

for each of the packets, a corresponding per-packet completion line configured to identify:

- 5            a length of a header of the corresponding packet;
- a length of a payload of the corresponding packet; and
- information configured to identify a location of the payload.

15.      The computer readable medium of claim 14, wherein each said  
10     per-packet completion line further comprises:

a checksum of the corresponding packet.

16.      The computer readable medium of claim 14, wherein said data structure further comprises a payload completion line configured to identify a  
15     second data structure in which payloads of the packets are stored.

17.      The computer readable medium of claim 16, wherein said information in said per-packet completion line comprises an offset of the payload in the second data structure.

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18.      The computer readable medium of claim 16, wherein:  
              said payload completion line further comprises a set of parameters applicable to each of the packets; and  
              a first parameter in said set of parameters is configured to identify a  
25     checksum type.

19.      The computer readable medium of claim 14, wherein the headers

are stored in fixed-sized portions of the data structure.

20. A computing device, comprising:
  - a communication interface configured to transfer packets from a
  - 5 communication link to the computing device;
  - software for operating the communication interface;
  - payload memory buffers for receiving payloads of packets transferred from
  - the communication interface;
  - hybrid memory buffers for receiving headers of the packets transferred
  - 10 from the communication interface and completion lines configured to facilitate
  - processing of the packets by the software;
  - a set of completion descriptors configured for the communication interface
  - to use to signal the software that one or more packets have been transferred to the
  - computing device;
- 15 wherein said completion lines in a first hybrid buffer include:
  - a payload completion line configured to identify a first payload
  - buffer in which payloads of one or more of the packets are stored; and
  - per-packet completion lines configured to identify locations of the
  - packets' payloads in the first payload buffer and locations of the packets'
  - 20 headers in the first hybrid buffer.
21. The computing device of claim 20, wherein said completion lines
- further include:
  - a null completion line indicating that no more completion lines are stored
  - 25 in the hybrid buffer.
22. The computing device of claim 20, wherein a first completion

descriptor used by the communication interface to signal the transfer of a first set of packets is configured by the communication interface to include only the identity of the hybrid buffer in which headers of the first set of packets are stored.

5           23.     The computing device of claim 20, wherein:

    said payload completion line further comprises a set of parameters common to the one or more packets; and  
    the set of parameters comprises a checksum type.

10          24.     The computing device of claim 20, wherein each said per-packet

completion line corresponds to one packet and comprises:  
    a length of a header of the corresponding packet; and  
    a length of the payload of the corresponding packet.

15          25.     The computing device of claim 24, wherein each said per-packet

completion line further comprises one or more of:

    an offset of the payload in the first payload buffer; and  
    an offset of the header in the first hybrid buffer.

20          26.     The computing device of claim 24, wherein each said per-packet

completion line further comprises a checksum of the corresponding packet.